CLAIMS

1. A direct conversion flat panel X-ray detector comprising a direct X-ray to charge converter with a common coplanar electrode, said charge converter being mounted on a readout thin film transistor (TFT) array supported by a transparent substrate, said substrate having a front side on which the TFT array is supported and a rear side opposite to said front side, and a layer of luminophor provided on the rear side of the substrate, said layer of luminophor being adapted to emit light under impact of the transmitted X-ray flux so as to automatically suppress ghost images due to charge trapping within the converter.

2. A detector according to claim 1, in which the TFT array includes a TFT matrix with an array of storage capacitors with a top electrode which collects the charges delivered by the converter and with each TFT source connected to an upper electrode of a corresponding capacitor, and each TFT gate electrode connected to a line scan lead common to all TFT gates of a same line, and each TFT drain connected to a readout column lead common to all TFT drains of a same column.

3. A detector according to claim 1, in which the converter is made of a material selected from the group consisting of a thick layer of cadmium telluride, a thick layer of thallium bromide, a thick layer of lead oxide, a thick layer of cadmium selenide, and a thick layer of amorphous selenium.

4. A detector according to claim 1, in which the converter has a multilayer pin structure where p and n outer layers are thin layers of amorphous selenium and middle i layer is a thick layer of a selenium alloy.

5. A detector according to claim 2, in which the array of storage capacitors and of the readout TFTs are encapsulated in a transparent insulator provided with an array

of transparent charge collecting pads made of indium tin oxide.

6. A detector according to claim 5, in which the array of storage capacitors have transparent electrodes made of indium tin oxide, the upper electrode being in contract with the charge collecting pads by vias through the transparent insulator material.

7. A detector according to claim 2, in which the array of storage capacitors have metal electrodes which are separated from the scan and readout leads by voids providing light feedthrough.

8. A detector according to claim 7, in which the metal electrodes are made of aluminum, titanium, gold, molybdenum or chromium.

9. A detector according to claim 2, in which the TFTs of the array cover less than 10% of the pixel area.

10. A detector according to claim 1, in which the layer of luminophor is a thick X-ray absorbing layer of red light emitting luminophor material selected from the group consisting of $Zn_3(PO_4)_2$; (Zn, Cd) S:Ag; YVO_4:Eu; Y_2O_3:Eu; Y_2O_2S:Eu and $Y_2W_3O_{12}$:Eu.

11. A detector according to claim 10, in which the luminophor material is combined with an X-ray absorbing material.

12. A detector according to claim 11, in which the X-ray absorbing material is gadolinium oxisulfide in a binder or a tungstate in a binder.

13. A detector according to claim 12, in which the tungstate is cadmium tungstate or calcium tungstate.

14. A detector according to claim 10, in which the luminophor material is combined with a light absorbing material adapted to attenuate and adjust light fluence delivered to the converter.

15. A detector according to claim 14, in which the light absorbing material is an organic light absorber dissolved in a binder used to bind the luminophor layer to the substrate.

16. A detector according to claim 14, in which the light absorbing material is a light absorbing powder dispersed in a binder used to bind the luminophor layer to the substrate.

17. A detector according to claim 14, in which the light absorbing material is a semitransparent layer deposited on the substrate.

18. A detector according to claim 17, in which said semitransparent layer is a thin metallic film of titanium, gold, chromium or aluminum.

19. A detector according to claim 10, in which the luminophor material has a wavelength between 580 nm and 620 nm.

20. A detector according to claim 1, in which the transparent substrate is made of glass.